Design Thinking in Software and AI Projects

Proving Ideas Through Rapid Prototyping

Robert Stackowiak
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To Jodie, my partner over these many years,
who makes solving life's problems fun.

—Robert Stackowiak

To Dan, my husband, who shares my consuming passion for user experience design, and my parents who encouraged my love of technology and creativity.

—Tracey Kelly

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About the Authors

Robert Stackowiak works as an independent consultant, advisor, and author. He is a former data and artificial intelligence architect and technology business strategist at the Microsoft Technology Center in Chicago and previously worked in similar roles at Oracle and IBM. He has conducted business discovery workshops, ideation workshops, and technology architecture sessions with many of North America's most leading-edge companies across a variety of industries and with government agencies. Bob has also spoken at numerous industry conferences internationally, served as a guest instructor at various universities, and is an author of several books. You can follow him on Twitter (@rstackow) and read his articles and posts on LinkedIn.

Tracey Kelly is the Envisioning Lead with the Catalyst team at Microsoft. She has been leading the Design Thinking training through North America and Europe to help Microsoft technology-focused architects and business leadership transition and transform to customer-centric and business outcome solutions. Tracey is also on the board of the Women's Technology Coalition and a former Women in Technology Director in Dallas. She leads design workshops and customer strategy sessions and has a long 20-year history of technology and design leadership at Fortune 500 companies to drive innovation.

Acknowledgments

We are obviously not the first to write about Design Thinking. Because previous practitioners shared their methodologies and approaches to problem identification and solution definition, we were able to learn from the best and adapt the exercises, tools, and methods into repeatable engagements appropriate to drive software and AI projects. We list many of these sources in the Appendix of this book and encourage you to investigate them as well.

Over the past few years, we worked in Microsoft Technology Centers and with the Microsoft Catalyst team in implementing many of these best practices. As we delivered Design Thinking training within Microsoft, we discovered many other practitioners of this approach within these groups and within Microsoft's partner community. We would like to thank some of the early proponents of applying this methodology there, including Craig Dillon, Carsten Scheumann, Shawna Flemming, Jennifer Kim, Jason Haggar, April Walker, Beth Malloy, Muge Wood, Charles Drayton, Dave Wentzel, Valerie Bergman, Sumit Wadhwa, Brandon Hancock, Jeff Hall, Daniel Hunter, Ryan McGann, Lafayette Howell, Kate Michel, Kevin Hughes, David Brown, Paul McPherson, Kevin Sharp, Harsh Panwar, Rob Nehrbas, Ruba Hachim, Amir Karim, J.P. DeCuire, Lora Lindsey, Susan Slagle, Sean McGuire, Nini Roed, Chris Han, Rudy Dillenseger, Ryan Hastings, Ovetta Sampson, Howe Gu, Aric Wood, and Thor Schueler.

As we were fine-tuning our techniques, we led workshops involving clients from a variety of industries who faced many different and often unique challenges. Those experiences helped us determine what worked and how to customize engagements for unique circumstances. Our thanks to those clients for enthusiastically taking part as we learned together. Hopefully, many of them continue to use Design Thinking as an approach today within their organizations.

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Introduction

We, the authors of this book, are on a journey. During much of our careers, we helped organizations define software, analytics, and AI technology footprints that were to be put into place to solve business problems. Some of those clients succeeded in building the solutions, rolling them out, and gaining widespread adoption. Others stumbled. Most often, when failure occurred, it was not due to the technology choices that were made.

Many technology people understand that the success rate of software development projects is not as high as it needs to be. The community has tried to solve this lack of success in various ways over many years. Most recently, there has been an emphasis on development in shorter cycles manned by small teams leveraging reusable services. The limited sprints in a modern DevOps approach can identify bad technology choices and unsuccessful development efforts sooner. However, this approach doesn't solve the problem of misguided efforts due to bad assumptions about what the business wants or needs.

Both of us spent significant time in recent years in front of business *and* IT audiences (including executives, managers, frontline workers, and developers/data scientists). When we got them together in the same room, magic began to happen. We were able to mediate discussions that provided a translation between what the business needed and what IT thought they wanted. Project goals became better defined, and success criteria became understood by all.

As we found our way, Design Thinking gained in popularity as a technique to be used in problem identification and solution definition. It was often applied where organizations were seeking to develop innovative processes and products. Today, this approach is taught in many leading universities and is practiced by a variety of consulting companies.

Where software is concerned, Design Thinking is most closely associated with user experience (UX) design of interfaces. However, we have found great value in using the technique to drive a much broader array of software and AI projects in our many client engagements.

As we gathered our own best practices, we researched Design Thinking books and guides that targeted all sorts of design projects. Over time, we've adopted a core group of exercises and approaches that we find useful in our workshops that more often (than not) lead to software and AI projects.

This book is primarily focused on these best practices as we describe what Design Thinking is, preparing for a Design Thinking workshop, problem definition, and solution definition in the first four chapters. As we proceed through the workshop content, we apply our favorite methods and tools in a step-by-step fashion. To help you understand the output expected in each exercise, we illustrate sample output we might obtain in defining a supply chain optimization problem and potential solution.

In the remaining chapters, we proceed through software and AI prototype development, production development, and production rollout. We felt it important to show how the development process that follows the workshop is linked and note where we believe it could make sense to reexamine the conclusions and information that we found in the workshop.

We believe that Design Thinking is critical to defining the destination that an organization wants to reach and why it needs to go there. Starting a software development or AI project without this knowledge can result in many wrong turns and possibly lead nowhere. Investing in the time it takes to run a Design Thinking workshop should become part of an organization's standard operating procedures for any design. But we believe this to be especially true for software and AI projects where the goal is to deliver business value quickly, gain widespread adoption, avoid missteps, and minimize wasted efforts and resources.

CHAPTER 1

Design Thinking Overview and History

Does innovation come from a big idea that comes to an organization's leadership in the shower? Does it only come from the organization's extremely creative people? Does innovation only happen within dedicated innovation teams? Does it take a lot of money to innovate? The answer to all those questions is – not necessarily. If you want to truly innovate by developing next-level ideas, you need to think differently about how you approach innovation.

Many companies are in a rush for the next big idea out of fear of being disrupted, losing market share, or losing their business' differentiated value. We are all too familiar with businesses that didn't innovate well or fast enough, such as Blockbuster, Kodak, Nokia, Motorola, Borders, Atari, Commodore, BlackBerry, RadioShack, Netscape, AOL, Myspace, and many more. These companies couldn't react to changing business conditions fast enough to retain significant importance among their customers.

Surveys and news articles often note the increasing rate of change in named companies that appear in the Fortune 500 and the frequent disappearance of many of them. We note some of these surveys and articles in the Appendix listing sources for this book. Research into the financial statements of many companies further identifies disruption from non-traditional competition as providing additional risk to their businesses.

Much has been written lately about the strategic value that design and Design Thinking can add to organizations of any scale and type. Some articles and studies even cite a direct correlation between revenue growth and Design Thinking. Thus, Design Thinking has gained momentum in the business world and is mentioned in many publications including those from the Design Management Institute, the *Harvard Business Review*, and *Forbes*.

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In this chapter, we provide you with an introduction to Design Thinking. The topics we cover are as follows:

- Design Thinking and innovation
- Overcoming fear of failure
- Approach is everything
- A brief history and frameworks
- Design Thinking, DevOps, and adoption
- Summary

Design Thinking and Innovation

Design Thinking is an innovation technique that can be adopted by anyone, anywhere, and at little to no cost. It is a problem-solving technique that can be applied to small or large problems. It can be used to address business or non-business problems.

Most people think that innovation requires one to be an artist or highly creative. In our experience, we have heard people we are training to conduct these workshops say, "I'm not really a creative person" or "I'm not an artist."

According to Alice Flaherty, an American neurologist and author of *The Midnight Disease*, "A creative idea is defined simply as one that is both novel and useful (or influential) in a particular social setting." Flaherty explains that this applies to every field, including programming, business, mathematics, and the traditional "creative" fields, like music or drawing.

Thus, Design Thinking and innovation are very misunderstood. Many people believe that innovation occurs when brilliant ideas spring out of nowhere or that innovation requires the right creative personality type or the right team of people and skills. While these conditions can be beneficial and some people do use time in the shower or when they are half asleep to come up with great ideas, Design Thinking is a much more widely inclusive approach.

The Design Thinking approach to innovation combines intent, exploration, and the views of a diverse group of people. People taking part should have an open mindset and be willing to fail in order to learn. More brains working on a problem enables focus on the problem from different perspectives and results in creation of a multitude of possible solutions. Diverse groups of people can think about and sort out complex problems,

even when they haven't experienced the problem before or have limited information or context about the problem.

The mind is an amazing problem-solving organ. There are different parts of the brain that are activated when intentionally focused on a problem (prefrontal cortex) vs. not focused on a problem (anterior cingulate cortex). Our brains are always working on sorting out challenges and problem, even when we aren't focused on it.[1]

The belief that innovation can spring out of anywhere is true, but it's way more valuable and exciting when used to solve a critical or pressing problem. As Plato has stated, "Necessity is literally the mother of all invention." A need or a challenge is the spark that ignites the imagination to create and invent ways of solving a problem. Additionally, one idea alone is good, but the power of multiple ideas to solve a problem exponentially increases solution quality.

The authors believe that the first idea generated isn't always the best idea. A volume of ideas or solutions promotes the opportunity for careful consideration of the best fit to solve a problem. It can take many people to create the needed volume even in situations where some individuals are gifted in creating such volume.

In *Buzan's Book of Genius* (1994), Leonardo da Vinci was ranked in first place for the top ten thinkers of all time. da Vinci was a prolific inventor that was truly ahead of his time because he was great at thinking and pondering problems and considered a variety of ways to solve those problems. He was a thinker and prolific sketcher. Of the 13,000 pages of sketches of images and ideas, he only had 30 finished paintings and 16 inventions, but some have changed history forever. Among da Vinci's notable inventions are

- Parachute
- Diving suit
- Armored tank
- Flying machine/glider
- Machine gun

According to the book *How to Think Like Leonardo da Vinci: Seven Steps to Genius Every Day*, we should be curious, test knowledge, learn from mistakes, improve our experiences, embrace ambiguity or paradox, use whole brain thinking, use the physical

[1]The brain and problem-solving: https://study.com/academy/lesson/the-brain-problem-solving-areas-process.html